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Everglades National Park – Surveying the southernmost cave in the continental United States

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Inside Earth

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Edited by Rodney D. Horrocks, Wind Cave National Park

A Newsletter of the Cave & Karst Programs of the National Park Service



Caption: Brian Killingbeck in the entrance to Palma Vista Cave in Everglades National Park. See featured article on page 3. (Photo by Alan Cressler – USGS).

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Fig. 3. Lampflora growth at 51 days under 592 nm yellow and W2050 white light at 145 foot candles. The results are similar, which is encouraging because the yellow LEDs have been in Frozen Niagara for 7 years and not grown any lampflora at a reasonable light intensity of about 4 foot candles.

One lamp that Peter brought to our attention is the Ledtronics XIW warm white (Fig. 2), which grows algae more than the enLux W2050 at 145 foot candles in the basement test, but at realistic intensities in the cave, it may support very limited or no growth. Time and the multi park lighting test will tell. One good thing about the XIW is that it comes in beam dispersion angles as tight as 20 degrees, which is a nice spotlight. The enLux W2050 comes in 80 degree standard beam spread and a 40 degree spread for \$20 more. So if you need to reach up high into a canyon, the XIW may perform better, and may still not grow algae if you keep the intensity on the cave features to somewhere around 4-5 foot candles or less. This is

a pleasant amount of light on a wall or flowstone feature.

Everglades National Park – Surveying the southernmost cave in the continental United States

*By Lee Florea – Florida Integrated Science Center,
US Geological Survey*

*Amber Yuellig – Tribal Historic Preservation Office,
Seminole Tribe of Florida*

Everglades National Park encompasses 1.5 million acres of grassland glades, tree islands, cypress strands, and mangrove marshes and is world renowned for natural vistas and wonders at the surface. The cave and karst resources in this park, however, are little known even though much of the park is underlain by limestone. In a recent communication to the authors, Alan Cressler (U.S. Geological Survey, written communication, 2006) described his visit to Palma Vista Cave in Everglades National Park last November that he originally explored and described over 13 years ago (Cressler, 1993).

Palma Vista Cave is located on one of the several small hardwood hammocks that occupy the eastern portion of Everglades National Park. These hammocks are related to the southwestern limits of the much larger, relatively high, but low-relief topographic feature in southeast Florida called the Atlantic Coastal Ridge. Most of the coastal ridge has been developed in the past century; the relatively higher elevations now host the Greater-Miami metropolitan area and the large agricultural district surrounding Homestead. Cressler (1993) noted that several caves have been found throughout the coastal ridge in Miami-Dade County. In his e-mail, however, he acknowledges that this site may be the only cave left in Dade County that remains undisturbed by development. At this time, Palma Vista Cave is the southernmost explored cave in the continental United States. William Loftus, a USGS biologist at the Everglades Field Station, has had an interest in the cave since he learned of its existence in 1990. Loftus and the late Durbin Tabb (Everglades National Park, written communication, 1990)

provide a detailed description of the cave in an unpublished manuscript:

Entry into this new cave was made from a sinkhole approximately 7 m long by 4 m wide and 1 m deep, formed by the collapse of the ‘roof’ of a western portion of the cave. The long axis of the sinkhole lies in roughly a west-northwest to south-southeast direction... The entrance to the cave is about 65 cm high at its opening off the sinkhole. From this entry, the cave roof rises and the floor slopes gently down to below water level... The cave chamber extends east from the entrance a distance estimated as 6 m. It also extends to the south along the full length of the sinkhole entrance, but is too low... to permit entry.

map, and cave diving will be necessary to determine the extent of these underwater passages.

Loftus has indicated that aquatic invertebrates have been observed in the cave, including a surface species of crayfish. Additional inhabitants observed in the cave during past winters include alligators and water moccasins. The biota observed during our visit was limited to terrestrial species of spider and millipede frequently encountered on the walls and ceiling, and small fish in the water.

Other caves and sinkholes in the coastal ridge of southeast Florida, such as the Cutler Ridge Fossil Site in Miami, are known to host cultural remains. Our inspection of the sediments that cover the floor of Palma Vista Cave, however, revealed no evidence of prehistoric occupation due to the great amount of organic matter that has accumulated on the cave floor. A thorough archeological investigation to determine any cultural occupation would require a well planned testing strategy that takes into consideration the unique biota that occur in this subterranean environment.

Of particular interest are speleothems within the cave that are underwater. Loftus and Tabb (Everglades National Park, written communication, 1990) noted the importance of these calcite formations in their unpublished manuscript, stating, “We take such deposits to be truly examples of deposition under subaerial conditions and not just some artifice of solution shaping.” This statement implies that the calcite formations developed in Palma Vista Cave during a previous and extended dry period. Such a condition would have existed when sea levels were much lower, such as the period between about 80,000 and 6,000 years ago that ended soon after the settlement of Florida by prehistoric people.

Other intriguing evidence of inundated cavities with subaerial speleothems exists within Everglades National Park. For example, John Small (1921) commented on a striking discovery made in 1917 by engineers constructing the Old Ingraham Highway between Royal Palm State

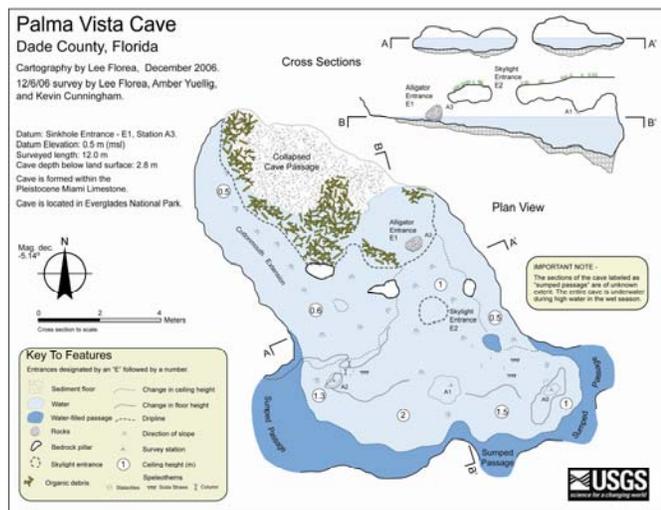


Figure 1: Map of Palma Vista Cave.

Our survey and inventory of the cave on December 6, 2006, resulted in a detailed map (Fig. 1). The cave contains a perennial pool of clear water that traps a large volume of organic matter (see cover photo). Water levels fluctuate seasonally in the cave. High water levels that completely fill the cave occur after the summer rainy season, followed by low water levels that permit exploration during the dry season. The cave does continue underwater beyond the limits of the

Park and Cape Sable (both of these sites are now part of the National Park):

The blast shattered the top of a subaqueous cavern! Stalactites varying from the diameter of a finger to over four feet were thrown out... The dipper of the dredge, terminating a boom nearly thirty feet long, was let down into the cavern and swung around in all directions without encountering any obstructions. Here in the wet Everglades is a subaqueous cave. Yet the sections of stalactites indicate great length and they could only have been formed in a cavern in which the floor, or at least the upper portion of the cavern, was elevated above the water table.

No evidence of this cavern is now known to exist, and the speleothems, once on display at Royal Palm State Park, have since disappeared.

For decades, karst within Everglades National Park has been described only in terms of surface features such as sinkholes and solution pits. Our recent survey of Palma Vista Cave adds an underground perspective of the karst processes occurring in southeast Florida, and furthers our understanding of the geology and hydrology of the Everglades ecosystem.

Cressler, Alan, 1993. "The Caves of Dade County, Florida". *Georgia Underground*, vol. 30, no. 3, p. 9-16.

Small, John, 1921. "Historic Trails by Land and Water". *Journal of the New York Botanical Garden*. vol. 22, p. 193-222.

Testing Light Intensity Dataloggers at Mammoth Cave

By Rick Toomey, Director, Mammoth Cave International Center for Science and Learning

During May 2007 Rick Olson (Mammoth Cave, Ecologist) and I installed a mixture of light intensity and light on/off dataloggers in an area on

the Mammoth Cave Wild Cave Tour Route. These dataloggers were installed to test how well they detect tours to provide guidance on their use in detecting visitation in backcountry caves. This study resulted from discussions associated with a talk that Jon Jasper presented at the 2005 NSS Convention. Jon had deployed a logger at Nutty Putty Cave in Utah in an attempt to monitor visitation. Discussion after the talk centered on whether independent data existed to indicate how well intensity meters detected groups, whether different sized groups could be distinguished, and whether hidden dataloggers could detect as well as more obvious, and thus vulnerable, dataloggers.



Fig. 1. HOBO H6 Light On/Off Logger, HOBO StowAway Light Intensity Data Logger, and HOBO Pendant Temperature and Light Intensity Data Logger being tested along the Mammoth Cave Wild Cave Tour route.

Wild cave tours, such as the one at Mammoth Cave, provide an excellent opportunity to experiment with light intensity dataloggers to address these issues. Wild cave tour routes have known numbers of known-sized tours that can be correlated with the results of the light intensity loggers. For that reason we have deployed a constellation of eight light data loggers (3 HOBO StowAway Light Intensity Data Loggers, 3 HOBO Pendant Temperature and Light Intensity Data Loggers, and 2 HOBO H6 Light On/Off Loggers) along the Wild Cave Tour Route. Examples of the loggers can be seen in figure 1. This project was planned in consultation with park Interpretation staff to be sure the guides knew why the loggers